the scientific aspect of the subject, but also on the harvesting of the bark crop in India, as well as on the commercial value of the Indian cinchona plantations. The manual will probably find its largest circulation amongst owners of land who have embarked in the cultivation of cinchona as a commercial enterprise, or those who intend doing so, Chapter iv. being devoted entirely to cultivation: and this part of the subject is treated of very fully; the author giving the various details of suitability of climate, temperature, rainfall, elevation, soil, drainage, &c., together with the more practical operations of preparing the ground, sowing seeds, propagation, planting, and other matters of a similar character, which, from the nature of Dr. King's position as superintendent of the Government cinchona plantations, must be trustworthy, if not from his own practical experience, certainly from the fact of his being able to command the opinions of the best men in this important branch. The same may be said of Chapter v., on the "mode of harvesting the bark crop." Turning to Chapter vii. on the "local manufacture of a cinchona febrifuge," we come to what is interesting and important to the whole community, namely, some of the practical results of the cinchona introduction into India, in the production of a cheap but efficient febrifuge. This preparation, which Mr. Broughton, the Government quinologist calls amorphous quinine, consists of the total alkaloids of cinchona bark, in the form of a non-crystalline powder, mixed to some extent with the resin and red colouring matter so abundant in red bark. "This alkaloid," we are told, "has been accepted by the medical profession in the Madras Presidency, as a remedy in malarious fevers, scarcely, if at all, inferior to quinine." About 600 lbs. of this substance was produced in the Neilgherry factory up the end of the year 1872-73, but the process of manufacture was found too costly, and the factory was accordingly closed. A more simple process was commenced in Sikkim, by Mr. Wood, who arrived in India in 1873, and by this process at the present time, about a ton per week of dry red bark is being worked up. The bark, hitherto so utilised, has been chiefly derived from thinnings and prunings, undertaken from time to time in the interests of the trees. By the end of the current financial year (1875-76) about 32,000 ounces of alkaloid will have been turned out. Next year a much larger quantity will be yielded. It has been calculated that of this efficient febrifuge there can soon be yielded from three to four tons annually, at a cost of rather less than one rupee per ounce.

Some interesting appendices are attached to the Manual—one shows the stock of trees in the Neilgherry cinchona plantation, another the stock in the Sikkim plantations, another the meteorology of the same plantations, and the last one gives the opinions of medical men holding important positions in India, on the efficacy of the cinchona febrifuge. With the manual are also issued three extra pages, descriptive of the process at present used for manufacturing the above substance, by Mr. C. H. Wood, the Government quinologist. J. R. J.

Die Euganeen. Bau und Geschichte eines Vulkanes. Von Dr. Ed. Reyer. (Wien, 1877.)

THIS is Dr. Reyer's first publication, and we gladly acknowledge it to be a very promising one. The subject, a minute geological treatise of the Euganean Mountains near Padua, illustrated by a well-drawn map, hardly calls for a lengthy notice on our part, but the little work is attractively written, and testifies to the complete mastery the author possesses over his subject. He minutely describes the structure of these mountains, then dwells upon the consequences he draws from this regarding their geological history, and raises before the eyes of the reader an interesting picture of times long past, and of forms long extinct. Dr. Reyer's language has the advantage of being clear and to the point, and free from all unnecessary ornament. We have pleasure in recommending the book to our readers, and hope that it may soon be followed by another production from Dr. Reyer's pen.

Die Erde und ihre Völker: ein geographisches Hausbuch. Von Friedrich von Hellwald. Erster Band. Zweite Auflage. (Stuttgart: Spemann, 1877.)

THIS work has met with deserved popularity in Germany. Dr. Hellwald is known as one of the most accomplished living geographers, and is well fitted to undertake the compilation of a work like the present. It will, we believe, be completed in two volumes, the volume before us dealing with America and Africa. The author follows to some extent the method of Reclus in his *magnum opus*, though, of course, on a smaller scale. He takes the great divisions of the land and water one after another, and in a thoroughly interesting and clear style, summarises all that is known of them on the basis of the latest discoveries, and under a variety of well-selected heads. The work, so far as we have tested it, is up to the latest date, and we know of no more trustworthy, interesting, and handy compendium of geographical information. Some of the illustrations might bear improvement, especially in the case of North America, where, we think, a freer use might have been made of the magnificent illustrations in the U.S. Survey publications. On the whole, however, the work is a valuable "family book," as it is meant to be, and we should think would prove of considerable service to teachers of geography. We have no doubt that many would welcome an English edition of the work.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Science Fellowships at Oxford

YOUR correspondent, Mr. Charles Wade, is an undergraduate of Magdalen College, and makes the very natural mistake of supposing that fellowships once assigned to natural science are, like the class of college prizes with which he is more familiar, namely, the scholarships, regarded by the colleges giving them as in a certain sense appropriated for future vacancies, to the subject which has once been connected with them. This is not the case, and accordingly your readers will find that Mr. Wade's enumeration of twelve fellowships, as assigned to natural science at Oxford, is erroneous, whilst the statement of "an Oxford Man" that only five fellowships are at this moment held as rewards for proficiency in natural science, is correct. From Mr. Wade's list must be removed the three Lee's readerships at Christ Church, which are not of the nature of ordinary fellowships, but are special foundations and enumerated by "an Oxford Man" with the professorships. Of the nine remaining on Mr. Wade's list, one at Merton does not exist, nor does that at Corpus, nor that at Pembroke, whilst that at Brasenose was not offered purely and simply for physical science. Hence there are but five fellowships at Oxford now held for natural science, or six if we count that at Brasenose.

Since I have no reason to ingratiate myself either with those who defend or those who attack the abuses of Oxford, I shall not imitate Mr. Wade, but sign myself SOCIUS

Spectra of Metalloids

IN a recent number of NATURE (vol. xv., p. 401) I gave a short abstract of a paper by Messrs. Angström and Thalen, on which I should like to make a few remarks. It is known that Plücker first drew attention to the fact that one body may have different spectra, and he seemed inclined to attribute these spectra to different allotropic states of the element. Later on, however, attempts were made to give another explanation of the phenomenon. It is against these attempts that Angström and Thalen chiefly protest in their paper. They use, however, the word element, in a different sense from that in which it is generally used. An elementary body, they say, can only have one spectrum. We are aware that bodies, as iodine and sulphur, can give two spectra, but then the band spectrum is due to an allotropic state, which, from a spectroscopic point of view, behaves

like a compound body. It would seem from this and other remarks, that, from a spectroscopic point of view at least, they consider an element to be not only a body which cannot be decomposed into two different bodies, but a body which cannot be resolved into any simpler molecular state. I have no objection against this if it is always clearly understood that our authors include allotropic states under the denomination of compounds. For instance, they lay great stress on the fact that a spectrum of fluted bands is always characteristic of a compound body. According to their definition of a compound this is perfectly correct, for no doubt the band spectrum belongs to a more complicated molecular state, but they cannot bring this argument forward as tending to show that Swan's spectrum of the candle belongs to a hydrocarbon, or that the fluted spectrum of nitrogen belongs to an oxide of nitrogen. The fact simply means that the molecule which gives these band spectra is to the molecule which gives the line spectra as the molecule which gives the absorption bands of iodine is to the molecule which gives the lines of iodine.

There is no doubt that we must be exceedingly careful, especially working with Geissler's tubes, not to ascribe to an element a spectrum which really belongs to a combination of that element with some other body present. The question what spectra an element really has must be settled in each individual case by careful experiments. Let us examine the two examples chosen by Messrs. Angström and Thalen. The first is carbon. Watts has already shown that the spectrum marked by him originally No. 2, really belongs to an oxide of carbon. The only spectrum under discussion is therefore Swan's spectrum of the candle. On this point Attfield's experiments are entirely conclusive. They have been amply confirmed by Watts and others. I take one case out of many. The flame of dry cyanogen gas shows the same spectrum brilliantly. The onus of the proof that a hydrocarbon can here be present lies entirely with those who make that assertion. Messrs. Thalen and Angström in the present paper assert that this spectrum is due to acetylene. In the year 1871 Prof. Angström published a paper, in which he tried to show that Wüllner's second spectrum of hydrogen really belongs to acetylene. Other experimenters have confirmed this fact. In order to escape admitting that carbon has two spectra, Messrs. Angström and Thalen are forced therefore to assume that acetylene has two spectra.

The chief object of this letter is to say a few words on the spectrum of nitrogen. In the year 1872 I published a paper in which I gave an experiment tending to show that the band spectrum of nitrogen really belongs to an oxide of nitrogen. The experiment was this: Clean pieces of sodium were heated in a tube containing nitrogen; the band spectrum then disappeared, and another spectrum came out, which I then thought to be identical with the lines of nitrogen. The experiments were repeated by Stearne and Wüllner; they also found that the bands disappeared, but the lines of nitrogen did not come out. I convinced myself that what I had seen was not the line spectrum of nitrogen, but the disappearance of the bands alone seemed to me to be an object of further investigation. Mr. Salet at last gave a full and correct explanation of the experiment. Nitrogen is absorbed by sodium under the influence of the electric spark, and the lines I had seen were the lines of sodium. As Mr. Salet has shown, my measurements agree better with the lines of sodium than with the lines of nitrogen. The bands of nitrogen remained if care was taken that the spark did not touch the sodium. If I have refrained hitherto from acknowledging the justice of Mr. Salet's conclusions, it is only due to the fact that I felt a natural curiosity to repeat his experiments; I have not yet been able to do so, but I have no doubt what the result would be. Mr. Salet's paper was only published after Prof. Angström's death, and I cannot help thinking that the professor would have considered his experiments conclusive against the assumption that the bands of nitrogen are due to an oxide of nitrogen. The only argument which Messrs. Angström and Thalen bring forward to support their theory is that in a tube containing rarefied air which showed the bands of nitrogen when the spark passed, nitric oxide was formed. But surely nitrous acid fumes are produced by sparks showing the line spectrum of nitrogen. Ozone is formed by sparks giving the lines of oxygen, yet we do not conclude that the line spectra of nitrogen and oxygen are due to nitrous acid and ozone.

If anyone still believes that an element can only have one spectrum at the temperature of the electric spark, I propose to him the following problem:—Let him take the three gases, carbonic acid, acetylene, and oxygen. If he investigates their spectra carefully he will at least find ten different spectra (two of them I only discovered lately). Out of carbonic acid alone he can obtain six. Let him find a sufficient number of possible compounds to account for all these spectra. ARTHUR SCHUSTER

The Annual Parliamentary Grant for Meteorology

THE Meteorological Department of the Board of Trade was, as is well known, constituted by Government in 1856 with the object of collecting and discussing facts and observations too numerous to be collected and discussed by private persons. The Department continued for ten years under the sole direction of Admiral Fitzroy, who, by his self-denying exertions and enthusiasm, and a genius for developing meteorology in certain of its practical applications, gave a great and withal healthy impetus to a sound study of the laws of weather.

In consequence of the recommendations of a committee of inquiry appointed after Admiral Fitzroy's death to review the results of the labours of the department, its control was transferred to a Committee of the Royal Society, who, in return for an annual grant of 10,000*l.*, agreed to carry out the duties connected with the office. The Committee were left perfectly free in their method and in their choice of labour, the only condition attached to the grant being that an annual account be rendered to Parliament of the expenditure and of the results obtained in each year.

The support of the public was freely given to the Committee in the work they had undertaken, but in the course of a few years an opinion took root and gradually extended to the effect that the methods of inquiry adopted by the Committee and the work of the Meteorological Office were so seriously faulty as to call for inquiry. To some of these points attention was drawn in NATURE (vol. xii. p. 101), your criticism being limited to little more than the baldest statement of facts, which anyone could easily examine for himself, a criticism which, so far as we are aware, still remains unanswered.

Upwards of a year ago the Lords of H.M. Treasury, seeing that the Meteorological Committee had received nearly 100,000*l.*, considered that the time had arrived for an inquiry, the grant being so considerable that they did not think they could be justified in continuing it for any lengthened period without satisfying themselves that the results obtained were such as to warrant the application of so large a sum of public money. A Treasury Commission was accordingly appointed on November 2, 1875, to inquire into the work of the Meteorological Committee, particularly that portion of it referring to storm-warnings; and, in the event of their deciding to recommend the continuance of the grant, to consider further upon what system it may be best administered. In connection with the latter part of the inquiry the Lords of the Treasury gave expression to their wish that the claims of the Scottish Meteorological Society for aid from the State should receive the consideration of the Commission. The Commission consisted of Sir W. Stirling Maxwell, Chairman, Mr. Brassey, M.P., Mr. Lingen, permanent Secretary of the Treasury, Mr. Farrer, permanent Secretary of the Board of Trade, Dr. Hooker, President of the Royal Society, Mr. F. Galton, and Gen. Strachey. Considering the many scientific questions of a strictly technical character which were to be dealt with, it is to be regretted that such names as Sir G. B. Airy and Prof. Balfour Stewart were not placed on the Commission; and it was perhaps unfortunate that Mr. Galton and Gen. Strachey were on it, seeing that they were also members of the Meteorological Committee whose work was to be inquired into by the Commission. The name of Mr. Milne Home, chairman of the Council of the Scottish Meteorological Society, was on November 29 added to the Commission.

On looking over the Report of the Commission, I am surprised to find an inattention to several important matters remitted to them by the Treasury. I do not find, for instance, that the methods adopted by the Meteorological Committee for the observation of the temperature of the British Isles, to which serious objection has been taken, and the character of the work of the office, to which also serious objections have been made, have been inquired into; and I find that the consideration of the claims of the Scottish Meteorological Society for aid from the State have been all but ignored in the Report of the Commission.

Passing on, however, to the recommendations of the Report we find that it recommends that the annual grant be increased from 10,000*l.* to 14,500*l.*; that, at least provisionally, some assistance be given to the Scottish Meteorological Society; that